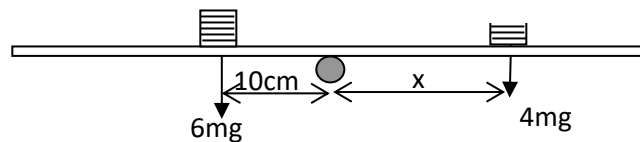


Q- A fulcrum is created by balancing a ruler on a pencil in the middle. Six one rupee coins are placed at 10 cm to the left of the pivot point.

(a) what is the torque exerted by the stack of the six coins about the pivot point if each coin has a mass of 10 grams?

(b) if the ruler is to be balanced again where you have to place the stack of other four coins?



(a)

The torque is the rotational effect of a force and is given by the product of the force and perpendicular distance from the fulcrum.

Mass of the six coins will be $6m = 6 \times 10 \text{ g} = 6 \times 10^{-2} \text{ kg}$

Distance of six coins from fulcrum $d = 10 \text{ cm} = 0.10 \text{ m}$

Hence the torque exerted about the pivot point will be

$$\tau = 6mg \cdot d = 6 \times 10^{-2} \times 10 \times 0.10 = 6 \times 10^{-2} \text{ Nm}$$

This torque is anti-clockwise and hence taken as positive.

(b)

To balance the ruler the net torque on it must be zero. As the torque of the four coins on the right side will be clockwise, it will be taken as negative and hence for balance

$$\tau = 6mg \cdot d - 4mg \cdot x = 0$$

Gives $x = 6 \cdot d / 4 = 6 \cdot 10 / 4 = 15 \text{ cm}$.

Thus, to balance 10 coins on the left, four coins must be placed at 15 cm from the fulcrum to the right.